

**Part 1            General**

**1.1                REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
  - .3 CSA O121-M1978(R2003), Douglas Fir Plywood.
  - .4 CSA O153-M1980(R2003), Poplar Plywood.
  - .5 CSA O437 Series-93(R2006), Standards for OSB and Waferboard.
  - .6 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
  - .7 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts.

**Part 2            Products**

- .1 Formwork materials:
  - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86, CSA O437 Series and CSA-O153.
  - .2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.
  - .3 Void forms: 150 mm deep, constructed from waxed corrugated cardboard wrapped in 0.152 mm polyethylene. Use plywood or similar product, to provide base to support reinforcing steel.
- .2 Tubular column forms: round, spirally wound laminated fibre forms, internally treated with release material.
  - .1 Spiral pattern not to show in hardened concrete.
- .3 Form ties:
  - .1 For concrete not designated architectural, use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
  - .2 For architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

- .4 Form liner:
  - .1 Plywood: Douglas Fir to CSA O121, 19 mm thick.
- .5 Form release agent: non-toxic, biodegradable, maximum VOC content: 350 g/L (less water)
- .6 Concrete Sealant: to Section 07 92 00 – Joint Sealants.

### **Part 3 Execution**

#### **3.1 FABRICATION AND ERECTION**

- .1 Verify lines, levels and centres before proceeding with formwork and ensure dimensions agree with drawings.
- .2 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .3 Fabricate and erect falsework in accordance with CSA S269.1.
- .4 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .5 Refer to landscape drawings for concrete retaining walls requiring exposed finishes.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .8 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .9 Align form joints and make watertight.
  - .1 Keep form joints to minimum.
- .10 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .11 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
  - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .12 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

#### **3.2 REMOVAL AND RESHORING**

- .1 Leave formwork in place for following minimum periods of time after placing concrete:
  - .1 Walls and piers: concrete curing temperatures of:

- .1 21°C to 35°C = 2 days.
- .2 16°C to 21°C = 3 days.
- .3 10°C to 16°C = 4 days.
- .2 Beam soffits, slabs, and other structural members: concrete curing temperatures of:
  - .1 21°C to 35°C = 14 days.
  - .2 16°C to 21°C = 17 days.
  - .3 10°C to 16°C = 21 days.
- .2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .4 Space reshoring in each principal direction at not more than 2 m. apart.
- .5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1 National Building Code of Canada 2010.
- .2 American Concrete Institute (ACI)
  - .1 SP-66-04, ACI Detailing Manual 2004.
    - .1 ACI 315-99, Details and Detailing of Concrete Reinforcement.
    - .2 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
  - .3 ASTM International (ASTM)
    - .1 ASTM A1064/A1064M-13, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
  - .4 Canadian Standards Association (CSA International)
    - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
    - .2 CSA-A23.3-04, Design of Concrete Structures.
    - .3 CAN/CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement
    - .4 CSA W186-M1990 (R2002), Welding of Reinforcing Bars in Reinforced Concrete Construction.
    - .5 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles
  - .5 Reinforcing Steel Institute of Canada (RSIC)
    - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

**1.2                SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and ACI 315.
- .3 Submit shop drawings including placing of reinforcement and indicate:
  - .1 Bar bending details.
  - .2 Lists.
  - .3 Quantities of reinforcement.
  - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by the Contract Administrator, with identifying code marks to permit correct placement without reference to structural drawings.
  - .5 Sizes of chairs, spacers and hangers
- .4 Detail lap lengths and bar development lengths to CSA-A23.3.

### **1.3 QUALITY ASSURANCE**

- .1 Submit in accordance with Section 01 45 00 - Quality Control
  - .1 Mill Test Report: upon request, provide The Contract Administrator with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
  - .2 Upon request submit in writing to The Contract Administrator proposed source of reinforcement material to be supplied.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Substitute different size bars only if permitted in writing by The Contract Administrator.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18.
- .3 Welded deformed steel wire fabric: to ASTM A1064/A1064M. Provide in flat sheets only.
- .4 Galvanizing of non-prestressed reinforcement: to CAN/CSA-G164, minimum zinc coating 610 g/m<sup>2</sup>.
- .5 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .6 Cold-drawn annealed steel wire ties to CSA G30.3
- .7 Mechanical splices: subject to approval of The Contract Administrator.

### **2.2 FABRICATION**

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Contract Administrator's approval for locations of reinforcement splices other than those shown on placing drawings.

- .3 Upon approval of the Contract Administrator, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

### **2.3 SOURCE QUALITY CONTROL**

- .1 Upon request, provide the Contract Administrator with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
- .2 Upon request, inform the Contract Administrator of proposed source of material to be supplied.

## **Part 3 Execution**

### **3.1 FIELD BENDING**

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by the Contract Administrator.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

### **3.2 PLACING REINFORCEMENT**

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.
- .2 Do not displace reinforcing to accommodate sleeves, inserts, waterstops, & reglets except where indicated or authorized by the Contract Administrator.
- .3 Prior to placing concrete, obtain the Contract Administrator's approval of reinforcing material and placement. Confirm schedule by giving the Contract Administrator 48 hour notice of completion of reinforcing steel placing. Allow after completion of placing reinforcing steel 4 hours for site review of reinforcing steel and formwork.
- .4 Ensure cover to reinforcement is maintained during concrete pour.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1        National Building Code of Canada 2010.
- .2        ASTM International (ASTM)
  - .1        ASTM C260-01, Standard Specification for Air-Entraining Admixtures for Concrete.
  - .2        ASTM C494/C494M-05, Standard Specification for Chemical Admixtures for Concrete.
  - .3        ASTM D1751-04(2008) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- .3        Canadian Standards Association (CSA)
  - .1        CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2        CAN/CSA-A3000-03, Cementitious Materials.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2        Provide testing and inspection results and reports for review by the Contract Administrator and do not proceed without written approval when deviations from mix design or parameters are found.
- .3        Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .4        Concrete hauling time: provide for review by the Contract Administrator deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

**1.3                WASTE MANAGEMENT AND DISPOSAL**

- .1        Use trigger operated spray nozzles for water hoses.
- .2        Designate cleaning area for tools to limit water use and runoff.
- .3        Carefully coordinate the specified concrete work with weather conditions.
- .4        Ensure emptied containers are sealed and stored safely for disposal away from children.
- .5        Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or

solidify liquid with an inert, non-combustible material and remove for disposal. Dispose of waste in accordance with applicable local, provincial and national regulations.

- .6 Choose least harmful, appropriate cleaning method which will perform adequately.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Delivery and Acceptance Requirements:
  - .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
    - .1 Do not modify maximum time limit without receipt of prior written agreement from the Contract Administrator and concrete producer as described in CSA A23.1/A23.2.
    - .2 Deviations to be submitted for review by the Contract Administrator.
  - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

### **Part 2 Products**

#### **2.1 MATERIALS**

- .1 Portland cement to CSA-A3001.
- .2 Supplementary cementing materials: to CSA A3001.
- .3 Cementitious hydraulic slag: to CAN/CSA A3000.
- .4 Water: to CAN/CSA-A23.1.
- .5 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density, except as otherwise specified.
- .6 Air entraining admixture: to ASTM C260.
- .7 Chemical admixtures: to ASTM C494. Obtain the Contract Administrator's approval before using accelerating or set retarding admixtures during cold and hot weather placing.
- .8 Superplasticizing admixtures: to ASTM C494. Obtain the Contract Administrator's approval before using superplasticizing admixtures. Concrete retarders: to ASTM C494 water based, low VOC, solvent free. Do not allow moisture of any kind to come in contact with retarder film.
  - .1 Maximum VOC Content: 350g/L (less water)
- .9 Grout: Portland Cement based non-shrink, non-metallic composition, meeting following requirements:
  - .1 Not exhibit bleeding or segregation at pumpable consistency.
  - .2 Compressive Strength: 25 MPa at 1 day.
  - .3 Bond Strength (ASTM C882) 13 MPa @ 28 days.



- .4 Positive expansion confirmed by ASTM C827.
- .5 Not produce a vapour barrier.
- .10 Non-premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 35 MPa at 28 days.
- .11 Cure and sealing compound: to CSA-A23.1 and ASTM C309, Type 1.
  - .1 Maximum VOC Content: 200 g/L (less water)
- .12 Pre-moulded joint fillers:
  - .1 Bituminous impregnated fiber board: to ASTM D1751.
- .13 Polyethylene film: 0.254 mm thickness to CAN/CGSB-51.34 under slabs on grade.

## **2.2 MIXES**

- .1 Refer to drawing S1.1 for concrete mix design requirements.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Obtain the Contract Administrator's approval before placing concrete.
  - .1 Provide 72 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
  - .1 Development of cold joints not allowed.
  - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete is permitted only after approval of equipment and mix.
- .5 Do not disturb reinforcement and inserts during concrete placement.
- .6 Prior to placing of concrete obtain the Contract Administrator's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.

- .1 Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .11 Do not place load upon new concrete until authorized by The Contract Administrator.

### **3.2 INSTALLATION/APPLICATION**

- .1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2
- .2 Sleeves and inserts.
  - .1 Set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100mm not indicated on structural drawings must be approved by the Contract Administrator.
  - .2 No sleeves, ducts, pipes or other openings shall pass through beams, walls or slabs, except where expressly detailed on structural drawings or approved by The Contract Administrator.
  - .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from The Contract Administrator before placing of concrete.
  - .4 Check locations and sizes of sleeves and openings shown on structural drawings with architectural, mechanical and electrical drawings.
  - .5 Set special inserts for strength testing as indicated and as required by Non-Destructive Method of Testing Concrete.
  - .6 Place anchor bolts to templates under supervision of trade supplying anchors prior to placing concrete.
- .3 Anchor bolts.
  - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
  - .2 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
- .4 Drainage holes and weep holes:
  - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
  - .2 Install weep hole tubes and drains as indicated.
- .5 Dovetail anchor slots:
  - .1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.
  - .2 Install continuous vertical anchor slots at 800 mm oc where concrete walls are masonry faced.
- .6 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .7 Joint fillers.

- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by The Contract Administrator. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
- .2 Locate and form isolation expansion joints as indicated. Install joint filler.
- .8 Cold Weather Concrete
  - .1 The following are minimum requirements for protecting concrete during and after placement in freezing weather. Except as noted below, concrete curing and protection to be in accordance with CAN/CSA-A23.1.
  - .2 Before any concrete is placed, all ice, snow and frost shall be completely removed from all formwork, reinforcing and other surfaces shall be raised above 10°C for 24 hours minimum prior to concreting. Where concrete work is to come in contact with the earth, the surfaces of the earth shall be completely free of frost when the concrete is placed thereon.
  - .3 Concrete aggregates and water shall be heated to not over 80°C.
  - .4 Concrete shall not be less than nor more than 30°C in temperature when deposited.
  - .5 Concrete when placed during freezing weather (or if freezing is anticipated during curing period) shall be fully enclosed and the temperature of same maintained at 18°C for the first three days and 10°C for the next three days.
  - .6 Provide adequate heating to attain specified concrete strengths required prior to stripping, or provide concrete mix which will meet specified stripping strengths under reduced curing temperatures.
  - .7 Keep protecting covering clear of concrete and form surfaces to permit full circulation of air, and maintain intact for at least 24 hours after artificial heat is discontinued.
  - .8 Heating enclosures: strong and windproof, but well ventilated. Heating units located as to prevent local overheating, drying of concrete, and damage from combustion gases. Only Herman Nelson heat exchange, fuel oil type heaters will be acceptable for slabs and flat areas. Units must be vented outside the building. No direct fired units will be acceptable.
- .9 Hot Weather Concrete
  - .1 All concreting operations during hot weather in accordance with CAN/CSA-23.1.
  - .2 Exercise particular care to prevent surface crazing of floor slabs due to combined high temperature and drying winds.
  - .3 Use of water reducing-retarding chemical admixture in the concrete mix may be required at the The Contract Administrator's discretion.
- .10 Abrasive Nosings: Install abrasive nosings with anchors fully embedded in concrete. Centre nosings on tread width at exterior concrete stairs. Install before initial set of concrete fill unless noted otherwise.

### **3.3 FINISHING HORIZONTAL SURFACES**

- .1 Following consolidation and screeding, immediately bull-float surface to close and smooth the surface.

- .2 Under adverse conditions only, excess bleed water may be removed from surface using procedures acceptable to The Contract Administrator and those noted in CSA-A23.1. Ensure surface is not damaged.
- .3 It is imperative that finishing be completed before surface of concrete dries, otherwise extensive cracking will result. Follow CPCA and CSA-A23.1 procedures and recommendations.
- .4 Ensure uniform, level surface is obtained.
- .5 Immediately after final finishing, apply additional coat of evaporation reducer to prevent drying shrinkage. Apply at manufacturer's recommended coverage. Do not apply evaporation reducer during any finishing operation nor should it be worked into surface.
- .6 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

### **3.4 JOINTS**

- .1 Install control joints at locations shown on the structural drawings.
- .2 Where slabs on fill abut curbs, walls and other vertical surfaces use pre-moulded joint filler.
- .3 Round edges, including edges of joints with a 10 mm radius edging tool.
- .4 Location of control and construction joints as follows:
  - .1 Structural slabs: As shown on Drawings.
  - .2 Curbs and upstand walls: matching joints in slabs.
- .5 In curbs and upstand walls, discontinue horizontal reinforcing steel at joints unless otherwise noted.
- .6 Control joints in flatwork and curbs shall be formed at locations specified on the drawings or alternatively sawcut via specialized dry-process cutting (e.g. Soff Cut) to depth indicated on the structural drawings.
  - .1 Dry-process saw cutting to occur immediately upon initial set of concrete. Timing of dry-process saw cutting will vary with weather conditions however are typically completed within 1 to 4 hours after final finishing.
  - .2 Timing of dry-process saw cutting will be responsibility of Contractor.
  - .3 Sawcutting 24 hours following placement will not be permitted.
  - .4 Upon minimum 28 day cure, re-cut joints to 12 mm wide by 10 mm deep. Prepare surface and infill with sealant in accordance with Section 07 92 00 – Joint Sealants.
- .7 Unless otherwise indicated, fill control and construction joints with pre-moulded joint filler.

### **3.5 CURING**

- .1 Cure and protect concrete in accordance with requirements of Section 7.4 of CSA A23.1.
- .2 Concrete surfaces to be cured at a minimum temperature of 10°C for the entire curing period.
- .3 Curing regime shall conform to Table 20 of CSA A23.1 and shall depend upon class of exposure.
- .4 Upon final finishing of concrete, and once concrete has hardened sufficiently to prevent surface damage, curing shall commence. Curing of concrete surfaces for curing Types 1 and 2 in Table 20 of CSA A23.1 shall be achieved using one or more of following methods:
  - .1 Curing compound as per section 2.1.11. Apply curing compound per manufacturer's recommendations.
  - .2 Waterproofing paper or plastic film;
  - .3 Forms in contact with concrete surface;
- .5 Additional curing requirements are required for concrete containing a high volume of supplementary cementing materials, such as fly ash, per CSA A23.1 Section 8.8.
- .6 Workers shall not be allowed on concrete for 12 hours after placement. Ensure that curing method does not interfere with concrete placing operations, or damage surface of freshly placed concrete.

### **3.6 FIELD QUALITY CONTROL**

- .1 Inspection and testing of concrete and concrete materials will be carried out by inspection/testing agency in accordance with CAN/CSA-A23.2.
- .2 Inspection and testing of concrete and concrete materials by Testing Laboratory designated and paid for by The Contract Administrator.
- .3 Take three test cylinders from each 75 cubic metres of each class of concrete placed or for each day of concrete placement if the latter is less than 75 cubic metres. Testing shall be as follows:
  - .1 One 7 day laboratory cured test.
  - .2 Two 28 day laboratory cured tests.
- .4 Take one additional test cylinder during cold weather concreting. Cure cylinder on job site under same conditions as concrete which it represents.
- .5 Make at least one slump test for each set of test cylinders taken.
- .6 Cure concrete test cylinders in location designated by testing agency for a minimum of 48 hours prior to transporting to laboratory.
- .7 Additional testing required due to low, inaccurate or otherwise questionable results shall be paid for by this Section.

- .8 Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2M.
- .9 Inspection or testing by The Contract Administrator will not augment or replace Contractor quality control nor relieve him/her of contractual responsibility. Testing agency shall report all results of testing found to be outside specified amounts to the Contractor and the Contract Administrator.
- .10 Number of trial mixes employed shall be sufficient to satisfy The Contract Administrator that specified air dry density will be met or exceeded.
- .11 Test each type aggregate for gradation, other properties to CAN/CSA-A23.2. Minimum 22.68 kg. samples.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1            Concrete hardener and sealing compounds.

**1.2                RELATED SECTIONS**

- .1            Structural Specifications

**1.3                REFERENCES**

- .1            A23.1-09/A23.2-09 - Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.

**1.4                SUBMITTALS FOR REVIEW**

- .1            Section 01 33 00: Submission procedures.
- .2            Product Data: Provide data on materials and application requirements.
- .3            Submit Material Safety Data Sheet (MSDS) for products provided.

**1.5                SUBMITTALS FOR INFORMATION**

- .1            Section 01 33 00: Submission procedures.
- .2            Manufacturer's Application Data: Indicate special procedures, conditions requiring special attention, and other details.
- .3            Test Reports: Submit substantiating data, test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data prior to application of Work.

**1.6                CLOSEOUT SUBMITTALS**

- .1            Section 01 78 00: Closeout Submittals.

**1.7                QUALITY ASSURANCE**

- .1            Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.
- .2            Applicator Qualifications: Company specializing in performing the work of this section with minimum two (2) years documented experience and approved by the manufacturer.
- .3            Materials:
  - .1            Minimum five (5) years documented field installations.
  - .2            Not to affect bonding capability of other materials applied to substrate.
- .4            Provide materials of this section from single manufacturer.

**1.8 DELIVERY, STORAGE, AND PROTECTION**

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 Store containers to manufacturer's written instructions.
- .3 Protect materials from freezing.

**1.9 ENVIRONMENTAL REQUIREMENTS**

- .1 Maintain ambient temperatures above 5 degrees C (40 degrees F) for twenty-four (24) hours before and during application and until liquid or mastic accessories have cured.

**1.10 ENVIRONMENTAL CONTROL**

- .1 Refer to Material Safety Data Sheet for information related to product contact with skin and eyes.

**Part 2 Products**

**2.1 MANUFACTURERS**

- .1 Hardener: Floor Hardener Pre-Mix (standard); Product: CPD.
- .2 Sealer: Acrylic Cure and Seal; Product: CPD.
- .3 Other acceptable manufacturers offer functionally and aesthetically equivalent products:
  - .1 Sealer: Lapidolith; Product: SONNEBORN.
- .4 Substitutions: Refer to City of Winnipeg Bid Opportunity.

**2.2 MATERIALS**

- .1 Water: Potable.
- .2 Hardener: Two step process used to harden and seal newly poured concrete floors. Hardener is a dry, granular mixture of Portland Cement and non-metallic hardening agents used for concrete floors exposed to abrasive and light to medium traffic.
  - .1 Standard of Acceptance:
    - .1 CPD; Product: Floor Hardener Pre-Mix (premium).
- .3 Sealant: Water based acrylic curing, sealing, and dustproofing compound; solution of chemically active hardening agents; clear.
  - .1 Standard of Acceptance:
    - .1 CPD; Product: Acrylic Cure and Seal WB.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Ensure surfaces are clean, dry and free of contaminants.



- .2 Ensure new concrete has cured minimum 28 days.
- .3 Ensure ambient temperature is minimum 10 deg C (50 deg F), and substrate temperature is minimum 4 deg C (40 deg F).
- .4 Apply Sealer only after the disappearance of all surface moisture.
- .5 Do not apply material if rain is predicted within six (6) hours after application to exterior surfaces.

### 3.2 PREPARATION

- .1 Surfaces must be clean, dry and free of all loose dirt, oil, wax, sealer, curing and parting compounds, and other foreign matter. Clean substrate surfaces to manufacturer's written instructions.
- .2 Acid wash or shot-blast steel trowelled surfaces, or surface harder installed floors.
- .3 Perform application on minimum 0.85 sq m (9 sq ft) test section; obtain approval of test section from Contract Administrator before proceeding with application.

### 3.3 INSTALLATION

- .1 Install membrane and tape seal to manufacturer's written instructions.
- .2 Protect adjacent work from spillage and overspray. Remove overspray on adjacent surfaces immediately before dry.
- .3 Apply materials where indicated and allow to cure according to manufacturer's written instructions.
- .4 Do not dilute or mix materials with other sealers.
- .5 Apply sealer with brush, roller or low pressure airless sprayer.
- .6 Apply even coats allowing for and observing adequate penetration. Do not allow surface to dry between coats.
- .7 Do not apply compound to surfaces that are restricted by product manufacturer.
- .8 Clean substrate and equipment with potable water.
- .9 Hardener:
  - .1 Apply in accordance with manufacturer's recommendations and technical instructions. It is critical that the hardener be provided at the appropriate time.
  - .2 Apply two shakes which should be no less than 3.5kg/m<sup>2</sup> for light manufacturing and 8kg/m<sup>2</sup> for heavy manufacturing.
  - .3 The first shake should be floated immediately to ensure it is completely in the concrete. The second shake should follow the first and be floated immediately.
- .10 Sealer:

- .1 Apply in accordance with manufacturer's recommendations and technical instructions.
- .2 Apply by brush, roller, or sprayer approximately 1-2 hours after final trowelling and disappearance of surface moisture.
- .3 Cover approximately 5.5m<sup>2</sup>/L.
- .4 Reapply at least 24 hours after first application.

**3.4 SCHEDULE**

- .1 Supply and install hardener and sealer to concrete slab in all areas with a final floor finish of exposed concrete, unless noted otherwise on Room Finish Schedule.
- .2 Refer to Room Finish Schedule

**END OF SECTION**